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CONCERNING THE PHILOSOPHICAL CONSEQUENCES OF THE THEORY OF RELATIVITY[1]

THE theory of relativity has made it necessary to reject conceptions which have been taken for granted in science and philosophy since the time of the Greeks. An understanding of the reasons for the introduction of these rejected concepts is necessary if we are to determine the consequences of this theory. This forces us to examine Greek thought.

Greek science was characterized by three major movements, one in Pre-Socratic philosophy, the second in mathematics and astronomy, and the third in medicine and biology.

It was in the first of these three movements that the conceptions which relativity physics has altered, were first laid down. The Miletians and Heraclitos had emphasized the two extensive facts of stuff and change, and thereby forced science to reckon with them in its theory. Then Parmenides proceeded to specify what these two facts involve. He noted that change entails either generation or motion, and that the fact of stuff justifies not only the principle that the real is physical, but also the principle that the real is being, where being means that the real does not change its properties. It was then easy for him to prove that the fact of stuff is incompatible with the fact of change if nothing but stuff, conceived either as one substance or many microscopic particles, exists.

The proof is quite simple and inescapable. Change can not be due to generation, for that contradicts the hypothesis that the real is being. Moreover, it can not be due to motion, for motion involves the transition of stuff from where it is to where it is not, and there can be no "where-it-is-not" if nothing but stuff exists. Nor can change be due to the motion of many particles—for two reasons. First, the motion of many particles calls for a referent other than them, as much as the motion of one. A difficulty is not met by multiplying it many times. Secondly, there can not be many particles if nothing but the stuff of the particles exists. For manyness calls for something to divide one part of stuff from another, and this

[1] Read before the Joint Session of the Eastern and Western Divisions of the American Philosophical Association in Columbia University on Dec. 31, 1929; and based in part upon the Deems Lectures, delivered in New York University in May, 1929, which are to appear in a forthcoming book entitled *Science and First Principles.*

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is impossible if nothing but the stuff to be divided exists. The essential point in the latter argument is not so much the need for an intervening medium, as the need of a basis for the distinction between one particle and another. In an atomic theory which regards the atoms as possessing the same intrinsic properties, the category of stuff gives only the respect in which the atoms are identical or one; it can not prescribe the respect in which they are numerically different or many. Stated positively this means that one atom can be distinguished from another only in terms of its relation to some common referent. If nothing but the stuff of the microscopic atoms exists there can be no such referent. Hence atomism is impossible.

It is to be noted that this argument takes care of those who would attempt to define atomic motion in terms of the relations of the microscopic atoms to each other. Before there can be even relative motion there must be many atoms, and the manyness, to say nothing about the motion, is meaningless unless there is a common referent other than those atoms.

Heraclitos and Parmenides attempted to escape this contradiction between the two extensive facts of stuff and change by denying one of the facts. When observation revealed that these obvious extensive facts can not be dismissed in this facile fashion there was nothing for those who followed Parmenides to do but to conclude that some referent in addition to the microscopic particles exists. When this referent was identified with the spacial characteristics of nature the doctrine of absolute space came into scientific theory, and the physical theory of nature was put in the form which it has maintained down through modern times.

It has been supposed that this placed the physical theory of nature upon sound foundations. Zeno proved that this is not the case. He showed that if the referent for motion is continuous space, then the movement of a body through a finite distance in a finite time is an impossibility. The proof is simple and valid. In a continuous space there are an infinite number of points in any finite distance. To move through a finite distance means, therefore, if motion is in space, that a body must pass from one point to another an infinite number of times. This is impossible in a finite period of time. Obviously, the Greeks should have concluded that a referent other than the microscopic particles exists and that this referent is not absolute space. Instead, science took over the physical theory as Leucippos stated it.

Meanwhile two other developments were taking place in Greek science. The first occurred in the sciences of mathematics and astronomy. An accumulation of empirical rules of measuring finally fell into systematic form with the deductive geometry of

Euclid, as the accumulations of astronomical observations finally gave rise to the deductive mathematical astronomy of Eudoxus and Hipparchos. Also an analysis of number theory went forward under the direction of Pythagoras, Theaetetos, and Plato. Investigations in music had led Pythagoras to suggest that the real is mathematical. This conclusion received an apparently final confirmation when the principles of the astronomical theory of Eudoxos were examined. These principles, which referred to the foundations of the astronomical universe, said not one word about physical objects. Instead, they revealed objective nature to be a system of perfect geometric forms which only reason can grasp. In this fashion the inorganic science of the Greek world, unlike that of the modern world, drove men to the conclusion that the real is rational, where rational means being constituted of mathematical forms, or, as Plato said, "objective ideas." Since mathematical or logical forms are exhausted in their meanings, and such meanings are eternal, changeless things, it follows that the principle of being holds for this as well as the physical theory of nature. We shall henceforth refer to this philosophy of science as the mathematical theory of nature.

It was natural that this outcome of Greek inorganic science should be foreseen and given articulate expression before it was completely realized in the astronomy of Eudoxos. It happens that the man who was responsible for this was a mathematician named Plato, and that the title which this theory has born in history is Platonism.

The third movement in Greek science occurred in medicine and biology. Hippocrates of Cos, Empedocles, and Aristotle were its outstanding figures. Hippocrates noted the two facts of mechanical causation and organization. Empedocles applied the atomic theory to the living thing and discovered the principles of struggle for existence and survival of the fittest. However, the physical theory of nature was doomed to failure in Greek science because it could not apply its atomic principles to specific local objects and processes. Hence, when Aristotle came upon the two facts of organization and generation he had no alternative but to regard them as ultimate and irreducible. This necessitated that he accept the principle of becoming and the doctrine that both matter and form are causes. Thus biological science drove Aristotle to an entirely new philosophy: the first thorough-going scientific philosophy to rest upon the principle of becoming. We shall refer to this conception as the functional theory of nature.

It is to be noted that the systems of Leucippos, Plato, and Aristotle are not the product of a single movement in speculative thought, but instead, are the outcome of three distinct movements in science. The philosophical character of Greek science owes its existence to

this fact. When science failed to converge upon a single theory of its first principles the consideration of such fundamental matters could not be ignored, and, hence, philosophy was inevitable.

Consider the issue to which these three developments gave rise. The functional theory is distinguished from the other two theories because it rests on the principle of becoming. Both the physical and the mathematical theories accept the principle of being. They differ in their conception of what being is; the former theory holding that it is physical stuff, the latter that it is mathematical or logical form. An examination of their conceptions of causation reveals, however, that these three different theories have something in common. They are three answers, and since they exhaust the logical possibilities, they are the only possible answers to one fundamental problem: the problem of matter and form, or of the relation between things and their relations. The physical theory would solve this problem by regarding all relations except spacial ones as effects of the properties and motion of material causes; the mathematical theory, with the thesis that only relations are causes; and the functional theory, with the contention that both matter and form are causes.

It was the great achievement of Greek science to discover this fundamental problem of its science and philosophy, to give the only possible answers to it, and to carry each one of these answers to its logical consequences. Furthermore, unless science passes to a more fundamental issue, which is impossible until it discovers more elemental concepts than entity and relation, it follows that the philosophy of Western science can be nothing more or less than the story of the fate of these three theories before historical circumstances and new empirical evidence. It is because of the new light which it has thrown upon this fundamental issue that the theory of relativity is of such great philosophical importance.

A consideration of the history of science from the Greeks to our own day will make this clear. Time does not permit an account of reasons. It is sufficient to note that following the Greek period the mathematical theory came into the ascendency; that with Thomas Aquinas the Aristotelian or functional theory began to dominate Western thought; and that in the seventeenth century, with the discoveries of Galilei, and the generalization of those discoveries by Newton, the physical theory of nature became the dominant philosophy of the Western world. Notwithstanding the criticisms of philosophers, such as Berkeley and Mach, it has dominated scientific and popular thought up to the present moment.

Although it was not evident upon the surface, the mechanics of Galilei and Newton implied the kinetic atomic theory. For this new

mechanics accepted the principle that the real is physical, i.e., it conceived of nature as a system of masses and forces. Also, it was a mechanical theory. Now, the doctrine of mechanical causation is not valid unless the causes of natural phenomena do not change their properties.[2] Hence, the Newtonian philosophy accepted the principle that the real is being, as well as the principle that the real is physical. These two principles can be reconciled with the fact of motion, which was the major theme of this mechanics, only by accepting the kinetic atomic theory. This aspect came out explicitly in LaPlace's Statement of Newton's laws of motion. Traditional modern science rested upon the physical theory of the Greeks in another respect. It regarded matter as moving in absolute space.

However, there were respects in which Galilei and Newton improved upon the physical theory of the Greeks. Galilei stated it in terms of the near at hand. This was the essential contribution made by the new science which Galilei termed "the science of local motion." In this discovery the uniqueness of modern thought and the modern world consists. The physical theory of nature was stated in terms of things which man could take hold of and move about. Laws were discovered, in the behavior of a ball let fall from one's hand to the ground, which applied to the pendulum and the projectile. This made experimental science important and rendered inevitable the control of commonplace practice by the most abstract of scientific theory which characterizes our contemporary life. And when Newton demonstrated that the ideas discovered by Galilei in a crude local object within man's grasp, condition the stability and motions of the astronomical universe, the revolution in the thought of intelligent men was complete. Physical categories here in the local part of this world were revealed to be the key to any other world which might exist. A shift of interest from other worlds to this one was inevitable.

This statement of the physical theory of nature in terms of local factors introduced a new element into science. Measurements and quantitatively exact deductions were possible. But these measurements brought with them a certain amount of relativity. For measurements call not merely for clocks and rods, but also for coordinate systems which are attached to molar bodies. Thus all measurements carry with them this dependence upon a particular reference body. Galilei noted, however, that there is no experimental means of telling which reference body has priority, providing one ignores accelerated motion. This enabled traditional modern science to state its laws in a form which was independent of any particular uniformly moving body to which one referred one's meas-

[2] See this JOURNAL, Vol. XXV, pp. 428 ff.

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urements. This equivalence of all uniformly moving bodies for the measurement of spatial and temporal values is known as the principle of relativity for Galileian frames of reference. It appeared as a corollary to Newton's laws of motion. Newtonian mechanics held only for observations referred to such frames. One may well ask what the laws of nature have to do with the reference frame which a scientist chooses. The laws of nature should be independent of any such choice. Only the general theory of relativity has removed this inadequacy. It may be said, therefore, that the latter theory has taken us nearer to that which is absolute in nature.

It is to be emphasized, however, that all modern scientific theories do not depend upon an approach to nature through coördinate systems with their accompanying rod and pointer readings. The kinetic theories of heat and gases are cases in point. In these theories the atoms are regarded as moving without any regard to a particular coördinate system. This must not be overlooked when one considers the philosophical consequences of current physical conceptions. The theory of relativity is not the only type of accepted and verified scientific theory. The evidence for the kinetic atomic theory is greater in amount and less subject to question.

As the evidence in the different sciences accumulated, the modern physical theory of nature was forced to complicate its doctrine. Galilei's discovery of the importance of acceleration made it necessary to add time as well as space as an absolute. Gravitation came in as another absolute, with the generalization of Galilei's ideas by Newton. And with the acceptance of the wave theory of light and Faraday's conception of electricity and magnetism, an absolute ether was introduced.

Thus matters stood at the opening of this century. The physical theory of nature was intact. Independent lines of evidence had confirmed and reconfirmed the validity of the kinetic atomic theory. But its doctrine had become quite complicated with the addition of four absolutes: space, time, gravitation, and the ether.

Into this situation came the theory of relativity. With one stroke the special theory rejected absolute space, absolute time, and the absolute ether, to substitute another absolute, termed space-time; and with another master stroke the general theory removed absolute gravitation and absolute space-time to leave mechanics with nothing but matter and a certain equation which specifies how the changing metric of the heterogeneous space-time of any frame of reference is conditioned by the motion and distribution of matter.

Before considering the consequences of this theory, let us note two of its characteristics. Firstly, it is still a physical theory which approaches nature through local physical systems. This elemental as-

pect of the theory has been ignored or dismissed by many physicists and philosophers, but Einstein has emphasized it again and again. It is a theory about the relations between measurements made with rods and clocks, and referred to reference frames which are attached to molar bodies. Now rods and clocks and molar bodies are physical objects. It must be maintained therefore that the theory of relativity still stands in the Galileian and the Newtonian tradition. It is a physical theory made applicable to specific bodies and processes. The relativity which it involves has nothing whatever to do with general philosophical relativity, or with human minds, or with perspectives; it is a relativity which can be spoken of only in connection with the dependence of measurements upon the molar objects to which these measurements are referred. Secondly, this theory does not make space-time absolute. In the general theory the structure of space-time changes. Certainly that which conditions the change is more fundamental than space-time. This conditioning factor is matter. Thus Einstein says: "According to the general theory of relativity the metrical character of the four-dimensional space-time continuum is defined at every point by the matter at that point and the state of that matter."[3] It is easy, therefore, to understand why Einstein regards his theory as a physical theory and refuses to accept the conclusions of Eddington and Whitehead.

Nevertheless, the theory of relativity has important philosophical consequences. Consider the effect of the special theory. It removes absolute space. This confirms the contention of Zeno. The attempt to define motion and atomicity in terms of a relation to absolute space is invalid. This means that the physical theory of nature, notwithstanding the evidence for its validity, referred to above, is shaken to its very foundations. For it is left without any meaning for atomicity and motion.[4] In such a condition it is helpless before the obvious fact of change. Of one thing we can be certain. Either a new referent must replace the discarded absolute space or the physical philosophy which has been at the foundation of modern science and the modern world must be completely rejected. In either event the consequences are most important for philosophy, as they are for every other branch of thought and action. This, I take it, is the general philosophical importance of the theory of relativity. It has brought the philosophical foundations of modern life and the modern world into question.

This consequence of the theory exhibits itself in a second difficulty which has arisen. We have noted how the general theory requires that the metrical structure of space be conditioned by the mo-

[3] *Sitz. d. Pr. Akad. d. Wiss*, 1917.

[4] See "The Problem of Motion," by F. P. Hoskyn, this JOURNAL, Vol. XXVI, pp. 337–346.

tion and distribution of matter. Professor Whitehead pointed out that it is very difficult to understand how measurement is possible upon such a basis.[5]

The validity of this criticism can be made clear by an analysis of the measurement of astronomical distances. A rod can not be directly applied to such a distance. Its length can be determined only by establishing a relation of equality between it and some local distance to which a rod is directly applicable. This necessitates an appeal to geometrical principles. Moreover, these principles must hold for the intervening space which joins the two distances. If the metric of this intervening space varied with the redistribution of matter two difficulties would occur. Firstly, the geometrical principles to which we appealed at one time would not be those which we used at a later time. Were this the case values determined by an observation in one century would not combine with those made in another to make sense. In short, the values in question would be incommensurable. Secondly, it would be impossible to know what geometrical principles to use in a single given observation until one had determined the distribution of matter in the intervening space at the time. But one can not determine the distribution of matter without making astronomical measurements. Thus one finds oneself in the peculiar predicament of not being able to make a single astronomical measurement until one has made a large number of such measurements. The experience of astronomers does not confirm this consequence. It must be assumed, therefore, that at least an approximately uniform metric exists which extends over macroscopic distances.

To meet this difficulty and explain why we have not discovered metrical variability before, Einstein was forced to state his general theory in terms of nature as a whole and to assert that the metrical variability is a local microscopic irregularity within a general macroscopic uniformity. There are many reasons for believing that this is the case.

Many have supposed that this leaves the relativity doctrine of space in satisfactory form. Quite the contrary is the case. The difficulty to which Whitehead referred has been merely shifted into another form. Instead of having to ask why metrical variability is so rare we now have to inquire why metrical uniformity is so obvious. For if the metric of space is conditioned by matter, as the general theory requires, it follows that exactly the reverse should be the case. Metrical variability should be the general rule and metrical uniformity the rare exception to it.

[5] A. N. Whitehead, *The Principles of Natural Knowledge*, Cambridge, 1919, Ch. IV. *The Principle of Relativity*, Cambridge, 1922, Ch. III.

This becomes clear the moment one notes that a relational theory of space which would regard space as conditioned by matter must define the metric of space in terms of relations between physical objects; ultimately this means, in terms of relations between atomic particles. In such a theory metrical uniformity exists when the relations between the atoms are constant, and metrical variability when they change. It is an essential and verified doctrine of the physical theory of nature that the atoms are in motion. This means that the relations between them are continuously changing and that metrical variability must be the general rule. Metrical uniformity should exist only over infinitely short increments of atomic motion. The second law of thermo-dynamics and the modern doctrine that matter is indifferent to order or design is an expression of this same fact. It was precisely because of this incapacity of matter to produce a constant uniform relatedness that our predecessors were unable to refer the spacial characteristics of nature to matter.

The first serious attempt at a solution of this difficulty was made by Professor Whitehead.[6] He concluded that the physical theory of nature must be rejected and that science must be reared upon a metaphysics which makes the principle of becoming fundamental, and admits a space-time relatedness which is not conditioned by matter. This modern edition of the functional theory of nature conceives of nature as a vast extensive process. It is by abstractions from this monistic process that our scientific concepts are derived. The first and least falsifying abstraction consists in the assignment of different parts of the "passage of nature" to different classes by means of the relation of simultaneity. The relativity of time arises from the fact that observed nature is too complex and ambiguous to insure that this assignment must always be made in the same way.

In each time system the complex of events exhibits two main factors: firstly, a certain constant uniform structure between its parts, termed space; and secondly, many adjectival permanences termed "sense objects," which are the content that appears within this structure.

Since there is a meaning for space only in a given time-system, a basis is proved for the relativity of space; and since the structure of space in a given time-system is constant and uniform and independent of the sense data and their "controls" which constitute molar objects, the uniformity and constancy necessary for measuring exists, notwithstanding the changing relations of objects. Thus, his theory provides a referent for molar motion in a given time system (but not, it is to be noted, for kinetic atomic motion which is independent of any time system) and a basis for measurement, while

[6] *The Concept of Nature*, Cambridge, 1920, Ch. III ff; also see footnote 5.

also enabling us to accept the relativity of space and time which the special theory necessitates. This is the unique achievement of his philosophy.

Consider this conflict between Einstein's and Whitehead's interpretation of the theory of relativity in the light of the history of Western science and civilization. In the Greek period three different theories of the first principles of science arose out of its empirical investigations to reveal the fundamental metaphysical problem of matter and form which is their common basis. In the succeeding centuries up to the present moment, each of these three theories had its chance to determine what man regarded as of first importance, and thereby to dictate what he did. The mathematical theory in a degenerate and Christianized form came first, the functional theory second, and the physical theory third and last. These periods of dominance correspond to the Dark Ages, the Scholastic Period, and the Modern Era, respectively. A comparison of the main characteristics of each age with its corresponding theory will reveal that the connection is not purely accidental. The mathematical theory can not make sense unless one deprecates the importance of the world of sensation. The Dark Ages with its neglect of empirical science and its other-worldly interests is such a philosophy in practice. The functional theory insists that the real is contained in sensation. The Scholastic period is one in which an interest in nature for its own sake revives. The physical theory of modern science taught that masses and forces, understood and controlled by means of laws discovered by an experimental study of the near at hand, are the key to everything else. The modern era of technical science and theoretically controlled practice is the logical outcome of such a belief. Science and common sense have supposed that the answer of the modern world is decisive and final. But what do we now find? The physical theory has been shaken to its very foundations. It stands without any theory of atomicity or motion and without an adequate theory of measuring. Furthermore, in raising within physics itself the vexing problem of the relation between matter and space-time which divides Einstein, Eddington, and Whitehead, it has brought us back again to the same old problem which the Greeks left. For what is space-time but a system of mathematical relations, and what is mathematical relatedness but the old form of Greek science and philosophy.

This throws an entirely new light upon the nature of the course of Western civilization and upon the degree of finality of modern thought. In fundamental matters we have not gone beyond the Greeks, for our problem in contemporary physics is the same old problem of matter and form which they first discovered and faced.

Moreover, the three different answers which contemporary scientists have given to this problem are the same three theories which the Greeks proposed. Einstein would define space-time in terms of matter. This is the physical theory of nature. Eddington would reverse the relationship. This is the mathematical theory. And Whitehead would regard matter and space-time as abstractions from a monistic process of becoming. The identity of this with the functional theory has already been indicated. Moreover our discovery of the weakness in our traditional modern philosophy is not particularly original. It was pointed out in ancient times by Zeno. Notwithstanding all the evolution and revolution which moderns have emphasized, we have been simply adding our bit of information, and trying out our particular inadequate answer, to the same old problem. Man has yet to see a philosophical answer to this problem which is adequate. When it comes the result will be a civilization which combines the virtues of the Ancient, the Medieval, and the Modern. It is because the theory of relativity has cleared the way for this advance, by bringing the first principles of science into question, for but the third time in the history of the Western world, that it is of such great philosophical importance. Sooner or later the first principles of contemporary science will crystallize out of its present problems and rival interpretations. Unless we pass to a more fundamental issue, and no such passage seems in evidence or called for, our answer must be in terms of one of the three Greek theories. Anything else can mean only muddle-headedness and confusion. History indicates that the theory which gains dominant assent will determine the course of civilization for the next few centuries.

The more specific question now arises: What light does the theory of relativity throw upon the nature of the scientific philosophy which will gain this assent? All three theories have proved themselves inadequate in the past. The suggestion is that a revision in one of these theories is called for. In the time which remains I shall attempt to show that the facts call for an amendment to the traditional physical theory.

This brings us back to the differences between Einstein and Whitehead over the nature of space and the foundations of measurement. I have indicated elsewhere [7] why the mathematical theory of Eddington seems to me to be inadequate. The issue resolves itself, therefore, into a choice between the physical and the functional theories.

Notwithstanding its obvious merits the solution of the problem of

[7] "Two Contradictions in Current Physical Theory and Their Resolution," *Proc. of Nat'l Acad. of Sc.*, January, 1930.

measuring which Professor Whitehead offers comes at a terrific cost. It is necessary for him to reject the general theory of Einstein. This follows because the independence of matter from space-time which his theory entails, necessitates the rejection of the doctrine that the metric of space is conditioned by and varies with the distribution of matter. To reject this is to reject Einstein's law of motion and his tensor equation for gravitation. The reason for this solution by Whitehead can be appreciated. He preferred an adequate theory of measuring to a law for gravitation which made measurement impossible. If a choice is necessary at this point I believe it must be made in favor of Professor Whitehead, for a science of mechanics without the general theory is possible, but mechanics without measurement is nonsense.

But the experimental findings do not permit us to make a choice. The evidence for the general theory which Whitehead rejects is as good as, and has been questioned less than, that for the special theory upon which his own philosophy rests. Moreover, my colleague, Professor Schlesinger, informs me that recent astronomical observations have combined with previous ones to confirm the conclusion that a heterogeneous metric exists. What is needed is a theory which can admit the macroscopic metrical uniformity which measuring requires, and accept the doctrine that space is conditioned by matter also. We have shown that the traditional theory of matter can not do this. It follows, therefore, that our traditional theory of the capacity of matter to produce structure and order in nature is false, and must be amended to meet new evidence.

The question immediately arises concerning what this amendment must be. An examination of the metric of this universe with special reference to the theory of matter necessary to condition it should provide the answer. Measuring and the general theory indicate that it possesses the two characteristics which Einstein has suggested. An approximate uniformity and constancy extending over macroscopic distances is interspersed with local microscopic heterogeneity and variability.

The basis for the microscopic metrical variability is already at hand in the traditional atomic theory. For, if we mean, as we must in a physical and relativity theory, that space is a relation between the atoms and that metrical variability is a change in this relatedness, it follows from the kinetic properties of the microscopic particles that metrical variability must exist. It follows also that the material basis for the constant macroscopic metrical uniformity can not be found in the microscopic atoms. For, if their properties are such as to necessitate a variation in their interrelations, then relational constancy must have some other source.

We discover, therefore, that something other than the traditional microscopic atomic entities must exist in this universe. In fact, we have but to note what is required to impose a constant macroscopic metrical uniformity upon the local variable relatedness of the microscopic atoms to discover what this additional factor is.

First, it must be physical. Otherwise it would be necessary to reject the general theory and its doctrine that space is completely conditioned by matter. Also, if it is to cause the microscopic atoms to compensate their variable relatedness so that a constant uniformity extending over great distances in nature is preserved, it must change the direction of their motion. This calls for the presence of an external force which only a physical object can provide.

Secondly, this physical entity must congest and surround all the microscopic atoms of the whole of nature. Otherwise, they would be merely crowded out into some other referent for their motion and macroscopic metrical variability would be the rule.

Thirdly, this physical object must be an atom rather than a compound substance. Otherwise some referent other than it would be required to provide a meaning for the distinction between one of its parts and another and the old difficulty over atomicity would recur.

We have but to bring these different necessary attributes together to discover that this universe must be constituted not only of the moving microscopic atoms of the traditional atomic theory but also of one large macroscopic atom, spherical in shape and hollow in its interior except for its inner field, which surrounds and congests them.[3]

If one is asked to summarize the reason for accepting this theory the answer is that scientifically verified evidence and logical proof necessitate the following conclusions (1) that nature is kinetic atomic in character, (2) that atomism is impossible without a referent other than the microscopic particles, (3) that this referent can not be absolute space, (4) that a physically conditioned space-time metric exists, which exhibits a peculiar combination of metrical variability and uniformity; and that this is the only theory which seems capable of reconciling all these facts.

Note how it meets the difficulties. Since the shape of the macroscopic atom is different from that of the microscopic atoms, a meaning for the distinction between it and them is possible without recourse to an additional common referent. Thus a referent is provided for the atomicity and motion of the microscopic particles without involving oneself in a circular argument. This makes it possible to define the metric of space-time in terms of relations between

[3] "The Macroscopic Atomic Theory," this JOURNAL, Vol. XXV, pp. 449–467.

physical objects without unsolving the problem of atomicity and motion.

Also, since the macroscopic atom introduces a fixed spherical form which surrounds and congests the microscopic atoms sufficiently to impose an approximately constant metrical uniformity, while not congesting them so much as to prevent their motion and the resultant variable relatedness, the peculiar combination of macroscopic metrical uniformity which measuring requires, and of microscopic metrical variability which the general theory necessitates, is made intelligible in strictly physical terms. Moreover, the different metrical properties are precisely where fact reveals them. Uniformity and constancy extend over the macroscopic distances of astronomical space, and variability is down in the regions of the microscopically small.

If one is asked to state the philosophical consequences of the theory of relativity in a few sentences, the reply, I believe, must run somewhat as follows. It has confirmed Zeno's contention that the atomic philosophers made a mistake when they introduced space as the referent for atomicity and motion, and has forced us to put the macroscopic atom in its place. From this, I believe, all the other physical [9] and philosophical [10] consequences of the theory can be derived. They are many in number and some are rather unexpected, but time does not permit a consideration of them here.

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BOOK REVIEWS

Studies in the Nature of Truth. University of California Publications in Philosophy, Volume II. Berkeley: University of California Press. 1929. Pp. 232.

Whether Pilate's famous phrase expressed an interest in the problem of truth, or, as Spengler argues, the contempt of a man of "destiny" for the whole range of truth, were Pilate to review the two volumes on truth in the University of California Publications in Philosophy he might well repeat his phrase in the Spenglerian manner, less, however, as a man of destiny than as a philosopher bewildered by the nuances and ramifications of the problem which here appear.

Like its predecessor, *The Problem of Truth,* the present volume of *Studies in the Nature of Truth* consists of a series of essays, in this case all by members of the staff of the University of California,

[9] See footnote 7.

[10] See footnote 8.

with the exception of an essay by Professor George H. Mead. The following papers make up the volumes: The Prepositional Nature of Truth, J. Loewenberg; Truths of Existence and of Meaning, George P. Adams; A Pragmatic Theory of Truth, George H. Mead; The Nature of Scientific Truth, V. F. Lenzen; The Nature of Truth in Transformation, D. S. Mackay; Truth and Perception, W. R. Dennes; Belief and Fact, Paul Marhenke; The Inaccessibility of Truth, D. W. Prall.

A reviewer can do little more than call attention to the significance of the volume, the freshness and directness of the analyses, and the high order of the essays, and then turn to an attempted synthesis of the contentions of the essays, realizing quite well that another reviewer would compose different variations on the same theme. To say that Professor Mead's paper is the richest in implications and Professor Dennes's paper is the most conclusive in the results attained, is undoubtedly to exhibit a personal bias, but the other papers, however excellent, seem to deal with preparatory or less basic phases of the problem.

The volume ends and begins, with the essays of Professor Loewenberg and Professor Prall, on the theme of the inaccessibility of truth. Loewenberg upholds the view that truth is multi-prepositional: it is understood *by* mind, *through* assertions, *in* experience, and is *about* the real nature of things (p. 5). All these prepositions are regarded as equally important, so that the slighting of any is called the fallacy of suppressed prepositions. With the view that all four factors are present in truth, one must agree, but hardly with the view that all are equally important. The terminal proposition ("about") inevitably becomes of central importance, since falsity is as multi-prepositional as truth, and the distinction between truth and falsity can only lie in the relation of assertions to that which the assertions are about. In spite of the excellency of the analysis, Professor Loewenberg gives no satisfactory answer to what constitutes truth. His further view that the objective of truth is unattainable he regards as being derived from the prepositional nature of truth (p. 29), but it seems clear that it is derived instead from a metaphysical theory of the relation of experience to reality. If one rejects this particular form of realism, he is not committed by accepting the multi-prepositional analysis to the view that truth is unattainable.

Professor Prall's attempt to show that truth is inaccessible proceeds differently. The claim is not the affirmation that no propositions are true, but rather that we never know if and when a proposition is true (pp. 201, 203). The method of procedure is to attack the certainty of both derivative and non-derivative judgments.

In regard to the former, it is held that immediate data are not knowledge, and that it is always possible to doubt the truth of a perceptual judgment (p. 219), as well as judgments about the past and future. However, if it is asserted that "x is between six feet and six feet three inches tall," it seems to me, as Dennes argues, that the verification can be such that the judgment can without qualification be called true. Prall says of such propositions that "they do not so much fail of truth as of meaning," since the height of a man is absolutely determinate (p. 216). It is hard to see how this supposed fact destroys the meaning of such propositions as are in question, nor why any greater degree of determinateness in the object than is intended or called for by the proposition is relevant to the truth-status of the proposition. As regards the truth of derived judgments, the argument shows that such deductions in part depend on non-derivative judgments, and in part gain a specious certainty by the use of definitions. In the course of the discussion, Prall states that "mathematics is a sort of knowledge which we are gradually realizing is not knowledge of the truth" (p. 221). Does or does not Professor Prall assert this proposition as true? To press this point, Professor Prall insists that his view does not lead to scepticism, but only to the realization that truth as inaccessible is not identical with success in action, and must be distinguished from knowledge, which is grounded faith. Is this proposition true, or only knowledge? Professor Prall modestly states that as a plain naturalism his view "claims no certain knowledge whatever" (p. 231). Now this claim is at least true, or else in fairness it must be admitted that neither the reviewer nor Professor Prall knows that Professor Prall wrote this essay, or that this essay truly expresses his view as to the inaccessibility of truth .

Professor Adams goes to an opposite extreme. He likewise distinguishes truth and knowledge, holding that truth supplies the reference to ideal elements which "express the theoretical interests and demands of the knowing subject" (p. 57). He insists that the presence of such ideal factors does not commit one to dualism and realism on the one hand or to positivism and humanism on the other, since it is possible to hold that there are objective meanings whose discovery is "dependent upon active processes of ideal construction and interpretation" (p. 58). Then the activity of mind is the means by which "the inexhaustible wealth of objective meanings native to existence can be known and disclosed" (p. 61). In this account, two matters may be mentioned. The truth of the Kantian position, as reiterated, for instance, by Lewis and in this volume by Lenzen and Adams, resides in the fact that without prior meanings by which questions are raised and predictions made, nature

can answer no questions. Truth and knowledge only arise in an activity of mind which results in assertions by symbols about the referents of the symbols. It does not follow, however, as some idealists suppose, that the object which is known is therefore constituted by mind, since what does appear is not ever directly dependent upon an assertion as to what will appear. The ideal elements do not supply the content or referent, but only the significant assertion. Nor does it follow, as Adams supposes, and this leads to the second point, that the necessity of meanings in attaining truth requires that what is disclosed are objective meanings. There is a tendency, represented by Woodbridge and Dewey, as well as by idealists, to talk of objective meanings, but to me this confuses the real issues. Thus Professor Adams speaks of "the very meanings which the glacial markings themselves really own" (p. 60). Undoubtedly glacial markings have objective connections with past and present events, but it is doubtful if the markings objectively mean the ice age without at least some reference to a potential situation in which the markings have become a symbol with meanings for some perceiver. It seems less confusing to regard all meanings as ideal factors or events, realizing that this usage does not in any way restrict the degree of interrelatedness which objects exhibit.

It will be necessary to merely refer to the three articles by Lenzen, Marhenke, and Mackay. Lenzen's essay brings out the relation between convention and correspondence in the attainment of truth, insisting that pragmatic criteria operate in the choice of conventions, but not in the correspondence which is the test of truth (p. 109). Otherwise the essay is of more interest for the philosophy of science than it is in the exact determination of the nature of truth.

Marhenke's discussion introduces the question of the relation of belief to truth, his insistence being that the objective of a belief, by which I take him to mean a proposition, is only true or false in so far as it is asserted, assertion being an act of mind. But to the reviewer neither the relation of belief to the objective of belief, nor the relation of the objective of a belief to "fact," is adequately or completely dealt with. It is not clear that assertion always involves belief, nor how it is possible, if the objective of a belief is a proposition, for any constituent of the objective ever to be identical with a constituent of the fact.

Mackay's essay aims to show that truth must be regarded as a special case of those transformations which constitute reality. In particular, truth is "the property of an interaction between physical patterns of transformations in existence and logical patterns of transformation in meaning" (p. 127). Truth is "a constant pro-

portion among the variables selected for the purposes of a given problem" (p. 134). While there can be no doubt that truth involves an interaction of meaning and existence, it is doubtful if Professor Mackay has adequately stated the nature of this interaction.

There remain for consideration the two articles by Professor Mead and Professor Dennes. Mead's paper is perhaps the most ingenious article in pragmatic literature which attempts to define truth in terms of the solution of a conflict in behavior. The richness of the essay lies in part in the nature of the attempt to approach truth in this manner, and in part in the host of subsidiary references to such topics as the interpretation of Renaissance philosophy as the rationalization of the medieval cult, the nature of the symbol, the social derivation of a common world, the metaphysics of objective relativism, and the pragmatic emphasis upon a security of method rather than a permanence of structure in envisaging a reconstruction of society. These latter topics can not even be mentioned here: it is to be hoped that they will receive the expansion they merit in the coming Carus lectures. The theory of truth presented is somewhat as follows: experience itself is not a problem, since it is simply there and since every problem presupposes that which is not involved in the problem. Something to which action was previously unhesitant exhibits new characters which tend to call out responses at variance with the original responses. The problem, then, is to so reconstruct experience as to allow action to proceed. "The test of truth which I have presented is the ongoing of conduct, which has been stopped by a conflict of meanings—and in meanings I refer to responses or conduct which the characters of things lead up to" (p. 73). Truth is not the gratification which follows the solution, but is "synonymous with the solution of the problem" (p. 73).

I admit that this theory of truth has blocked my conduct for several days, and that an ongoing of conduct, such as a review involves, has required the introduction of factors not sufficiently emphasized in the above account. It is difficult for me to see the way in which action and perception are to be reconciled, and it is a question whether the truth is determined by the ongoing of conduct or by the perceptual occurrence of that which was predicted. Mead himself writes that "all experimental findings are lodged in perceptual presents and they are the final touchstones of all theories" (p. 80), so that both strains enter the account, but they are not adequately brought together. It is possible to attempt to interpret a perceptual present in terms of conduct, but the fact that actions are themselves perceived or given just as are colors and the positions of hands on dials has made many such attempts fail to

be convincing. As Mead's essay stands, the relation between action and perception, and the relation of truth to each, remain without adequate treatment.

A further indication that Professor Mead's account of truth in terms of the ongoing of conduct requires supplementation lies in the treatment of the propositions of formal logic and mathematics. He states that the "truth" of any such proposition "will be found in its effectual employment in the construction of working hypotheses" (p. 75). Now while the component propositions of formal studies may not merit the adjective "true," it is certainly a fact that true propositions may be made about the relations of such component elements or structures, and there are many such true propositions in logic and mathematics that do not seem to be reducible to factors allowing conduct to proceed and which do not seem to be merely tools for the construction of working hypotheses. While a critical pragmatism may perhaps deal with such truths, it is certainly true that few pragmatists have done justice to the domains of formal logic and mathematics.

In saying that Professor Dennes's paper on "Truth and Perception" is the most conclusive, I am merely saying that in spite of many opportunities for disagreement in detail, his thesis seems to me to be sound. Generalizing a sentence of his (p. 156), a judgment is true if what the judgment asserts is perceived or experienced to be as the judgment asserted. This is essentially the same doctrine that the reviewer has developed elsewhere as the prediction theory of truth, in which a truth is a verified prediction. Professor Dennes argues, convincingly I believe, against the view that perception can be reduced to movements or actions, and against the view that perception can be reduced to judgment. While admitting with the pragmatist that the demands of behavior are necessary for there to be any knowledge process at all, and with the idealists that ideal constructions or meanings are necessary for there to be any knowledge, he insists that "neither practical success nor rational norms have anything to do with the *truth* of the judgments which would never have been made without their influence" (p. 158). Admitting that this would need to be more carefully worded, the statement would seem to be a happy formulation of the pragmatic, idealistic, and empirically realistic demands.

As Professor Dennes states, the realm of truth is small, and does not include many of the most stirring and significant judgments, but it is wise to clearly separate those judgments whose validity has been certified from those judgments, however important, which must still be regarded as hypotheses, as claimants to truth, and as opinions.

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The World as an Organic Whole. N. O. Lossky. Translated from the Russian by Natalie A. Duddington. New York: Oxford University Press, American Branch. 1928. Pp. vi + 199.

L'intuition, la matière et la vie. N. Lossky. Paris: Libraire Félix Alcan. 1928. Pp. vii + 177.

These two works of Professor Lossky are mutually complementary. *L'intuition, la matière et la vie* (the cover bears the erroneous title *La matière, l'intuition et la vie*) consists of three essays dealing respectively with the nature of knowledge, of the material world, and of life. *The World as an Organic Whole* supplies the metaphysical context.

Professor Lossky's "intuitivistic" theory of knowledge is expounded in the first essay, which, it may be noted, is simply a translation into French of the "Epistemological Introduction" of the author's *Handbuch der Logik* (Berlin, 1927). Intuition is not itself knowledge, but all knowledge, whether of objects present in perception or of objects remote in time or space, rests upon an intuitive *basis*—i.e., upon an immediate intuition of an object that is immanent to the consciousness of the subject without the intermediary of any representation, but at the same time transcendent in relation to the conscious subject himself—an element, in fact, of the external, trans-subjective world. In such intuition the object enters into the consciousness of the subject "in all its fullness, with all its systematic character, with all the relations which connect its different aspects with one another and with the rest of the world" (*L'intuition,* etc., pp. 43–44). But mere intuition is not enough. In order to *know* the object thus present in intuition, the subject, in a series of acts of discrimination and analysis, must distinguish its various aspects and trace its connections with other elements of the world. The results of such acts are expressed in judgments. Every true judgment states a *necessary* relation between subject and predicate, though this relation may be, in Kantian terms, synthetic rather than analytic. This necessity is the expression of that systematic interconnectedness of the world in virtue of which it forms not a chaos but a cosmos. Neither the content nor the relational structure of the object of knowledge, however, is created or conditioned by the mind of the knower; both aspects are simply *given* in intuition.

The oddest feature of Professor Lossky's theory of knowledge is his doctrine of "epistemological coördination." This is "a peculiar non-causal relation between the conscious subject and the object of which he is conscious" (*The World,* etc., p. 10). It is not to be confused with the act of intuition. It is "a *preconscious union* of subject and object, a previous condition of the possibil-

ity of the birth of consciousness and of knowledge, of the birth of the act of intuition directed upon the object" (*L'intuition,* etc., p. 24). The act of intuition is not due, even in the case of perception, "to the causal action of the object upon the subject's body and upon his mental life, for if it were, the subject could know only his own mental states produced in him by the object" (*The World,* etc., p. 10). It is rather the result of "epistemological coordination." But what brings the subject into epistemological coordination with one object rather than another we are not told. Nor is the nature of this relation itself altogether clear. It is described simply as "a mental relation of 'taking possession of in consciousness,' a relation that we grasp immediately when we say: 'I have such and such object within the sphere of my consciousness.'" And how this differs from the sort of immanence in consciousness that occurs in an act of intuition it is very difficult to see.

The second essay, on "Matter in an Organic Conception of the World," argues the merits of a theory of "dynamistic atomism." Matter is that which fills space as an impenetrable volume. It is simply a manifestation of forces of repulsion and attraction—essentially a *process.* These forces are exerted, in time and space, by a multiplicity of substantial agents, themselves supra-spatial and supra-temporal, and thus immaterial or spiritual in nature. Their activities are directed toward ends, and are thus consciously or unconsciously purposive. Hence "the material process, if we consider its two aspects, interior and exterior, is never purely mechanical: it is always a *psychoid-mechanical* or psycho-mechanical process" (*L'intuition,* etc., p. 101). Only the higher grade of spiritual substances is endowed with fully conscious activity.

The principal advantages claimed for this theory are as follows. (1) It enables us to avoid the grave difficulties that have hitherto attended the attempt to conceive of the action of one portion of matter upon another, whether by way of contact or by way of action at a distance. For between the non-spatial substantial agents of dynamistic atomism there is neither contact nor distance: their action is into space, but is itself supra-spatial in nature. (2) It avoids the difficulties of psycho-physical parallelism, and makes it possible to hold to a modified form of interactionism. For it is not so difficult to conceive of the interaction of psychical and physical processes when these are viewed as activities no longer of wholly disparate substances, but of one and the same substantial being. The mode of this interaction can be exhibited, moreover, in terms of the theory of dynamic atomism, as involving no breach either of the law of the conservation of energy or of that

of inertia. Finally (3), it accords well with contemporary doctrines concerning the electrical constitution of matter; for "what are electrical charges, if not manifestations of forces of repulsion and attraction" (*L'intuition,* etc., p. vi.)?

The final essay, on "Contemporary Vitalism," is devoted chiefly to a somewhat detailed exposition of the views of Driesch and E. von Hartmann, by both of whom the author has been strongly influenced. Driesch's postulation of an "entelechy," in order to explain the peculiarities of organic behavior, is accepted. Driesch, however, "leaves unexplained the main point, *viz.,* the way in which the entelechy can interfere so profoundly with the course of material processes" (*L'intuition,* etc., p. 151). His failure at this point is due to the insufficient development of his metaphysical foundations. Von Hartmann is more helpful in this respect, but still not wholly satisfactory. He mistakenly denies the plurality of substances; fails to see that "direct observation itself shows us clearly that the aroma of individuality derives from the whole and sets its seal upon the elements" (*L'intuition,* etc., p. 160); introduces the unfortunate hypothesis of a peculiar non-central "vital force" acting alongside other forces; and fails to realize that an abstract principle like a force, determined in its action by a fixed law, can not account for the constructive ingenuity and creative purposiveness of living organisms. The principle of life must be not a force, but a substance; for life manifests "the creative activity of a being ... that is the source of the law and not its slave" (*L'intuition,* etc., p. 162).

In *The World as an Organic Whole* Professor Lossky gives to these doctrines a wider setting. This is not the place for any extended account of his imposing metaphysical system. But it may be remarked that it is very reminiscent, both in its results and in the nature of the arguments employed, to that of Plotinus, to whom, indeed, Professor Lossky frequently refers.

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Essays in Philosophy, by Seventeen Doctors of Philosophy of the University of Chicago. Edited by T. V. SMITH and W. K. WRIGHT. Chicago: The Open Court Publishing Co. 1929. xvi + 338 pp.

No movement in recent American thought has been more noteworthy or widespread in its influence than the Chicago School. The present coöperative volume of essays is a well-deserved tribute to the teaching activities of four of the great leaders in that movement, Professors Tufts, Mead, Moore, and Ames, all of whom have

had a distinguished connection with the University of Chicago for more than thirty years, and some of them since the foundation of the institution in 1892.

Besides its memorial purpose, this volume gives us an opportunity to discover what the younger group of instrumentalists are thinking, and how. Not that there is any of the sectarian spirit in these essays. Perhaps not a few of the contributors would object to the appellation of instrumentalist. All of them have been exposed to the chastening influence of recent realism, mathematical logic, and behaviorism. Yet there is clearly discernible in the majority of the essays a common temper and method of approach to philosophical problems due to their acceptance of the logic of instrumentalism and its negative metaphysical implications. At the same time the editors are assuming too much when they venture to call this attitude and philosophical temper characteristic of the "philosophically self-conscious Middle West." Even at its beginning the Chicago School was more than a geographical designation. It was a historical accident that instrumentalism found on the shores of Lake Michigan a local habitation and a name; and when we consider the history of the founders of the school, and the geographical distribution of its present adherents (of which the geographical distribution of the contributors to this volume is a fair indication), it seems not a little absurd to look upon it as the philosophical contribution of the Middle West, or as expressive of the philosophical beliefs and attitudes of this vast region. Only those persons who have a prejudice against both the Chicago School and the Middle West will regard this identification as plausible. For the unprejudiced reader, it is best to approach these essays for what they are: brief studies of philosophical problems written by persons who have studied under and been influenced by the great teachers to whom the volume is dedicated, and possessing only such unity of method and attitude as those circumstances would tend to bring about.

It is impossible to do more than briefly mention the seventeen essays in this volume. But mindful of the fact that there are "seventeen doctors of philosophy" lying in wait for the incautious reviewer of the book, I shall studiously refrain from generalities and attempt to give some idea of the specific contents of the various essays. There are three essays devoted explicitly to logical problems. Professor J. F. Crawford, in "Meaning and Reality," contributes a brief exposition of the instrumentalist doctrine of meanings, with the special aim of showing how these transitory and functional elements have so often been divorced from experience and erected into timeless entities. Charles William Morris, in

"The Relation of Formal to Instrumental Logic," clearly shows that deductive systems have a place only within the reflective situation, and are dependent upon human choice for the selection of postulates and the construction of definitions. Thus instrumental logic completes rather than destroys formal logic. In the same group belongs the interesting but unconvincing "Critique of Pure Science" of C. E. Ayres. Mr. Ayres' critique is founded upon a distinction between the logic of machinery, which is the basis of pure science, and the logic of supposition, which underlies social behavior. The objects of science are the creations of its own method, a method based upon the technique of perception. It follows that science can never deal with the realm of social behavior, which consists of matters not perceptible to eye and ear. More than that, science itself is a social institution; and its very claim to universal efficacy is a supposition. But we are left by Mr. Ayres in complete logical darkness in the realm of social behavior, a darkness unrelieved by any glimmers of the Kantian practical reason to which he apparently believes his own doctrine is the legitimate successor. We readily grant that the logic of the machine is inadequate to social behavior; but the logic of supposition appears to be no logic at all.

In the field of ethics, T. V. Smith discusses "Monistic Morality," undertaking to show that "the moral goal and the moral matrix are one," thus reconciling teleological and formal theories. This identification of the moral end with the moral source is effected through the expedient of "taking as the source of conduct the very idea of the actual end." I am not sure what this cryptic saying means, if it is more than that one can only be motivated by ideas of what one wants to do. In any case it is surprising to see such hungering and thirsting after monism. The really practical way to avoid the no doubt vicious dualism between unattainable ideals and unideal actualities is to inquire diligently which among the various possibilities suggested by the actual are to be regarded as individually and socially desirable ends. This is an inquiry which instrumentalists have as yet done little to advance, though work in this direction ought to be most congenial to the humanistic strain in pragmatism. Charner M. Perry's essay on "Reason in Moral Judgments" is particularly disappointing in this regard. The rôle of reflective choice in moral matters, according to this author, is restricted to showing that, given certain existing and unquestioned activities and purposes, x would be better than y. Mr. Perry really does not mean that reason has nothing to do with questioning these existing activities and purposes; but his distrust of absolutes prevents him from approaching the special problems that arise in the

application of reason to moral values. Granting that we may not be able to reach finality, yet some ends are presumably better than others. The unexamined life is certainly not fit for an instrumentalist to live.

It is pleasant to find in this volume itself a criticism of this lacuna in pragmatist ethics. Mr. A. K. Rogers' able and convincing treatment of "Instrumentalism and Ideals" voices his dissatisfaction with the instrumentalist tendency to be preoccupied with means to the neglect of evaluation and criticism of ends. The fact that elements of feeling are inevitably bound up with ends and values should not, Rogers insists, lead us to leave these judgments lying outside the realm of rational discussion. There are, he suggests, at least three criteria for the objective measurement of value: *viz.*, durability, extension (i.e., the number of people enjoying the value in question), and quality. Even more important than these criteria is the fact that human judgments upon value do in reality tend to converge as a result of rational discussion. An interesting approach from a different direction to the same problem is presented in L. L. Thurstone's competent essay on "The Measurement of Psychological Value." The same mathematical technique which he has previously employed in the measurement of attitudes permits us to measure the appetition-aversion toward an object, or its "psychological value." The usefulness of such a method for measuring spontaneous and unreflective appreciations is quite evident; unfortunately it is limited to unreflective judgments, for the introduction of factors leading to rational reflection and choice complicates and invalidates the procedure.

The two essays on religion may appropriately be treated here. Mr. W. K. Wright expounds a theory of "The Relation Between Morality and Religion." These institutions he regards as two different attempts on the part of the group to preserve and transmit recognized group values. Though these two sets of values are not to be identified, yet morality and religion have rendered each other mutual service—religion by providing supernatural sanctions to moral standards, and morality by giving metaphysical support to some of the postulates of religion (God, freedom, immortality). Mr. J. R. Geiger's essay on "Prayer, Autosuggestion, and God" shows a clear understanding of the special problems of the philosophy of religion, as well as a fineness of feeling for the special qualities of religious experience. The thesis maintained in the essay is that the psychological account of prayer as merely autosuggestion is an inadequate description of the experience which prayer is, a thesis briefly but convincingly presented.

Perhaps the least satisfactory application of the instrumental-

ist doctrine is found in the essays on esthetics. In Miss Kate Gordon's thesis that art is not the expression of anything, but the creation of something, and Mr. Van Meter Ames's interpretation of art as the dexterous adaptation of means to ends, the danger is very evident of doing less than justice to the esthetic experience through trying to fit it into the instrumentalist logic. But in each case the esthetic doctrine of the writer seems to be broader than the bare statement of these theses would indicate. Mr. Ames's thesis, for instance, is not consistently maintained and I suspect that its plausibility for him is due to the fact that he has interpreted it broadly enough to include elements of quite divergent theories. Certainly he insists throughout that the sense of beauty is no intermediary stage of the vital process, but an ultimate peak of experience.

The remaining essays in the volume can only be mentioned. Professor Wesley Clair Mitchell's "Postulates and Preconceptions of Ricardian Economics," Professor D. A. Piatt's plausible exposition of "Berkeley's Behaviorism," and Prof. Clarence H. Hamilton's article on "Buddhistic Idealism in Wei Shih Er Shih Lwen" are all interesting contributions to the history of thought. Professor Ellsworth Faris gives a very brief survey of "Current Trends in Social Psychology"; and Professor John Wild writes the only essay in cosmology in the entire volume, on "The Grand Strategy of Evolution," a militantly teleological interpretation of the world-process, which is pictured as an effort to achieve the absolute. Lastly, Professor J. R. Kantor in "The Philosophical Implications of Organismic Psychology" treats us once more to a demonstration that all traditional philosophies are condemned as verbal systems because of their preoccupation with psychic processes and absolutes. It is fortunate for the reader that the organismic psychology here outlined with its "implicit behavior," stimulational properties, and the like, is itself such a convincing illustration of what he means by a "verbal system." If Professor Kantor could only see that he is himself a forthright scholastic craftsman with a complex for generalizing and attaching labels, we could all commit hocus-pocus together, and remain on the best of terms.

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JOURNALS AND NEW BOOKS

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NOTES AND NEWS

Mary Whiton Calkins

The members of the Executive Committee of the Pacific Division of the American Philosophical Association wish to express on behalf of the Division and for themselves their grief over the loss American Philosophy has suffered through the untimely death of Mary Whiton Calkins. An erudite scholar, a skillful teacher, an incisive thinker, a noble woman, Miss Calkins served the cause of disinterested knowledge with genuine devotion. In criticism she was always patient and fair, of incomparable courtesy, willing to learn from the views of others, no matter how opposed to her own.

Steadfast in her positive convictions, she presented the truth as she saw it, in writings as rigorous in method as they were forceful in style. To these intellectual gifts she united a capacity for friendship truly great. In California where she spent several seasons, her many friends mourn her death and treasure her memory.

For the Executive Committee,

J. LOEWENBERG, *President.*
H. D. ROELOFS, *Secretary.*

22 March, 1930.

The Facsimile Text Society has recently been organized and has begun operations. The aim of the Society is to reproduce rare printed texts, pamphlets, and manuscripts that are of interest to scholars. The method of reproduction will be the offset process which is based upon photographs of the original documents. Thus the Society is able to guarantee in their reproductions a text that conforms in every essential to the original documents.

The publications of the Facsimile Text Society will appear in five series, as follows: *belles lettres,* history, philosophy, political science, and history of science. The first issue of the Society which has just been announced will consist of numbers in three series, *belles lettres,* political science, and philosophy. They are Donne's *Biathanatos* (1644), the *Poems* of Thomas Warton the Elder (1748), and *Poems on Several Occasions . . . by a Gentleman of Virginia* (1736) for the *belles lettres* series; *A Discourse of Trade* by T. M. (1621) for the political science series; and the English translation (1690) of Henry More's *Enchiridion Ethicum* for the philosophy series. All five of these volumes will be available for distribution to members of the Society in April.

The Society relies for its continued success upon the support of scholars and book-collectors. It especially solicits members from the students of literature and political science and philosophy in the colleges and universities of the country. Membership in the Society costs five dollars a year; and each member is privileged to receive free five dollars' worth of the books brought out by the Society and are at liberty to purchase any additional books at a discount of 33 1/3% from the list price. Subscriptions to the Facsimile Text Society may be sent to Professor Frank A. Patterson of Columbia University, who is the executive officer of the Society.